

TITLE: Development of an Operational Specific CAT Risk (SCATR) Index

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SIGNIFICANT ACCOMPLISHMENTS TO DATE IN FY-83:

The original formulations of Roach (1970) and Oard (1974) for the calculation of CAT potential from synoptic scale data have been extended. An index which gives a measure of the specific risk of encountering CAT - the SCATR index - has been defined. This index takes into account both the locally and advected contributions to the energy necessary for CAT. The advected contribution is associated with the role of atmospheric gravity waves (AGWs).

The SCATR index has been calculated for a number of cases where documented encounters with CAT occurred. Of particular interest were those made for cases involving severe CAT. The results for the two severe CAT cases run were quite impressive and have begun to elicit considerable interest from operational aviation meteorologists. The results of these severe CAT encounters, the United accident of 0125Z 4 April 1981 over Hannibal, MO and the Kennedy-Shapiro field study of 11 and 12 April 1978, will be presented at the Ninth Conference on Aerospace and Aeronautical Meteorology.

FOCUS OF CURRENT RESEARCH:

Currently research is focusing on detailed analysis of the results obtained to this point and the pursuit of information on other documented severe CAT encounters. The point of the analyses is to develop an understanding of the dynamics associated with severe CAT outbreaks. The other CAT encounters are being sought in order to test the SCATR technique for different severe CAT producing situations. Several other severe CAT encounters have been uncovered in the course of discussions with airline meteorologists. The data necessary to calculate SCATR indices for these particular encounters is currently being gathered.

PLANS FOR FY-84:

- o Calculation and analysis of SCATR indices for several other severe CAT encounters of particular interest to the commercial airline meteorologists mentioned above.
- o Arrange for access to NMC analysis data base and development of interfacing software for obtaining daily near real-time conventional meteorological data.
- o Calculate SCATR index fields using the above conventional data near real-time.

- o Arrange to obtain timely PIREPS of CAT.
- o Calibrate SCATR index using the appropriate PIREPS over a six to nine month period.
- o Thorough validation of performance using the CAT PIREPS and calibrated SCATR index/ completed proof of concept for operational systems.

RECOMMENDATIONS FOR NEW RESEARCH:

- o Parameterization for significant, large scale-terrain.
- o Adapt SCATR algorithms for use of Limited-Fine-Mesh (LFM) forecast products for SCATR index forecast.
- o Performance of SCATR formulation using mesoscale data set (e.g., AVE/SESAME).

LIST OF PUBLICATIONS PREPARED SINCE JUNE 1982:

- o Keller, J. L., 1982: Detection of Clear Air Turbulence Using a Diagnostic Richardson Number Tendency Formulation. J. Aircraft, 19(11), 904-908.
- o Keller, J. L., 1983: CAT Detection and Forecasting Using Operational NMC Analysis Data. Proc. Ninth Conf. Aerospace and Aeronau. Met., American Meteorological Society, Omaha, Nebraska.